MFPC2003 MANUFACTURING TECHNOLOGY - II (3-0-0)

Course Objectives:

- 1. To understand the geometry of cutting tools and their influence on cutting forces and surface finish.
- 2. To analyze the mechanics of chip formation and the impact of tool materials and wear on machining performance.
- 3. To explore machinability criteria, tool life equations, and measurement of cutting forces using dynamometers.
- 4. To gain knowledge of conventional machining processes, machine tools, and tool specifications.
- 5. To study the principles of machine tools, including kinematics, speed transmission, and job/tool holding mechanisms.
- 6. To introduce non-traditional machining processes and their applications in modern manufacturing.

MODULE-I (6 LECTURES)

Geometry of cutting tools in ASA and ORS, Effect of Geometrical parameters on cutting force and surface finish, Mechanics of chip formation, Merchant's theory, Force relationship and velocity relationship, Cutting tool materials, Types of Tool Wear: Flank wear, Crater wear, Wear measurement.

MODULE-II (6 LECTURES)

Cutting fluid and its effect; Machinability Criteria, Tool life and Taylor's equation, Effect of variables on tool life and surface finish. Measurement of cutting force: Lathe tool dynamometer, Drill tool dynamometer.

MODULE-III(6 LECTURES)

Conventional machining processes and machine tools – Turning, Drilling, Shaping, Planning, Milling, Grinding. Cutting tools used for these processes, and their specifications. Production Machine tools – Capstan and turret lathes, and Gear hobbing machines.

MODULE-IV(6 LECTURES)

Principles of machine tools: Kinematics of machine tools, speed transmission frommotor to spindle, speed reversal mechanism, mechanism for feed motion, Tool holdingand job holding methods in different Machine tools, Indexing mechanism and thread cutting mechanism, Quick return mechanism.

MODULE-V(6 LECTURES)

Non-traditional Machining processes:Ultrasonic Machining, Laser Beam Machining, Plasma Arc Machining, Electro Chemical Machining, Electro Discharge Machining, Wire EDM, Abrasive Jet Machining

Course Outcome:Upon successful completion of this course, students will be able to:

- CO1 Explain the geometry of cutting tools and its effect on cutting forces and surface finish.
- CO2 Apply the mechanics of chip formation and analyze the influence of tool wear on machining performance.
- CO3 Evaluate machinability criteria, tool life equations, and utilize cutting force measurement techniques.
- CO4 Demonstrate knowledge of conventional machining processes and the selection of appropriate machine tools.
- CO5 Analyze machine tool kinematics, speed transmission, and various mechanisms used in machining operations.
- CO6 Compare and contrast different non-traditional machining processes and their suitability for various applications.

BOOKS

- 1. Manufacturing technology (V-II) by P.N.Rao, Tata McGraw Hill publication.
- 2. Fundamentals of Machining and Machine Tools, G.Boothroyd and W.A.Knight, CRC Press.
- 3. Metal Cutting Theory and Practice, A.Bhattacharya, Central Book Publishers.
- 4. Modern Manufacturing Processes, P.C.Pandey, H.S.Shan, Tata McGraw Hill.
- 5. Manufacturing Science, Ghosh and Mallik, East West Press.